The volume, on which Dr. Wright has evidently bestowed great pains, contains an astonishing amount of useful and accurate information about common things, and the extreme ingenuity of many of the experiments deserves the highest praise. Teachers of elementary science will find in it much that is suggestive; and many of the experiments, sometimes slightly modified, might be profitably incorporated in a school course.

A work on the "Threshold of Science" in the educational sense of the phrase has yet to be written. The task is a difficult one, and very few men have the originality, knowledge, and scholastic experience which are alike necessary for its accomplishment. Owing to several circumstances, the value of instruction in the methods of acquiring "natural knowledge" has not been fully recognized in the school curriculum. It cannot be expected that much general progress will be made until teachers are provided with a book of this kind adapted for use in public schools. WYNDHAM R. DUNSTAN.

THE ZOOLOGICAL RECORD FOR 1889.

The Zoological Record for 1889. Edited by Frank E. Beddard. (London: Gurney and Jackson, 1890.)

THIS, the twenty-sixth volume of the "Record of Zoological Literature," is published by the Zoological Society of London, and we have to congratulate the Secretary and Editor on the volume having been published well within the year 1890, the literature of which it treats belonging to the year 1889. Possibly this welcome acceleration in publication may be in some measure due to the freshness of the recorders, to whom we would, however, venture to suggest that work of this nature, the value of which depends so greatly upon its accuracy, may be too hastily done. We are too thankful for what we have received to be in a fault-finding mood; yet a very superficial glance over this volume reveals some evidence of a want of care which it would be right, and we think easy, to avoid.

Some changes have taken place in the recorders, the work done last year by Mr. W. E. Hoyle being divided, Mr. P. C. Mitchell taking the Mollusca, Mr. O. H. Latter taking the Brachiopoda and Polyzoa, and Mr. S. J. Hickson the Cœlenterata.

The record of "General Subjects," compiled by Mr. J. A. Thomson, is a feature added to the programme, as carried out under Dr. Günther and the Zoological Record Association, and to a certain extent it supplies a deficiency, nor could it be in better hands than those of the present recorder; but, in order that there shall be as little as possible of duplicate references in the volume, the Editor-in-chief should keep a watchful eye that works that are of right treated of under the special subjects are not unnecessarily referred to here. Thus we think, for an example, that Ecker's "Anatomy of the Frog" need not have been quoted twice, under text-books in the "General Subjects," and under Ecaudata in the record of Reptilia and Batrachia; nor need Mr. A. G. Butler's paper on "Insects supposed to be distasteful to Birds" have been quoted in full three times (General Subjects, Aves, and Insecta), and there are very numerous instances like this. Such records serve little other purpose than to test the powers of the recorders. The "Record" is not a subject catalogue.

A more serious objection may be taken to the departure from uniformity in the arrangement of the memoirs in the record of the Reptiles and Batrachians, and of the Fishes, where, instead of the authors' names being arranged alphabetically, they are printed as they turned up in the recorders' notes; perhaps, as a very trifling blemish, may be mentioned the occurrence of the footnote indicating that the recorder had not seen the work indicated by an asterisk, which notice is not always attached to each record, and in some cases it is attached when not needed. The record of Insecta is a wonderful piece of work, with its 849 references in chief. Here, too, the most useful method of numbering all the papers is adopted, so that a reference is found with a minimum of trouble.

The index to genera recorded as new in this volume is most unfortunately incomplete; by some oversight the whole of the new genera to be met with among the Cœlenterata have been omitted. It may be also noted that the new forms described among the Alcyonaria in the "Narrative of the Cruise of the *Challenger*" have never as yet been alluded to. There was not a column for "Travels and Faunistic" in the volume for 1885, the year in which the "Narrative" was published, and probably the fact that new genera and species of Alcyonaria were described in it escaped the notice of the then recorder of the group; but they were also unnoticed in the "Record" for 1887; and in the volume now under notice they are again passed by, so that no trace of such remarkable genera as Callozostron, Strophogorgia, &c., will be found in the whole series of records.

We have called attention to these defects, as they may be easily rectified in future volumes, and because we think they are of such a nature that the avoidance of them for the future lies in the hands of the Editor. As suggestions, we might add that it is very desirable that, when possible, short but characteristic diagnoses of all the new genera should be given; of course, when these are founded for well-known species, the mere indication of this would suffice, but it would save many a weary search in out-of-the-way journals if such diagnoses of new genera—as, for example, we find in Mr. Hickson's record of the Cœlenterata—were always given, and this used to be the general practice.

OUR BOOK SHELF.

Reports on the Mining Industry in New Zealand. Pp. 209. (Wellington: George Didsbury, Government Printer, 1890.)

THIS volume of reports from the Minister of Mines on the production and condition of mining enterprise in 1889, to both Houses of the General Assembly in New Zealand, is a continuation of similar reports which we have noticed in previous years. As regards the principal items of production there appears to have been a slight increase in gold—203,211 ounces valued at £808,549, against 201,219 ounces and £801,066 in 1888; but the coal raised has diminished by nearly 10 per cent., or from 613,895 tons to 586,445 tons; Kauri gum, which is next in value to gold among the totals, has also diminished from 8482 tons and £380,933 value to 7519 tons worth £329,590. The final result is that the value of minerals raised was £1,493,167 in 1889, or a little less than in 1888, when it was £1,531,614. In addition to the native supply,

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128,000 tons of coal are imported, mainly from New South Wales; but about 80,000 tons are exported, 47,115 tons of which are returned as going to the United Kingdom. It is not, however, shown what the latter quantity is, whether it is a special gas coal or merely coal taken by steamers for English ports.

The detailed reports from the different districts contain some matters of general interest, among which may be noticed the use of dredgers for raising auriferous drift from the beds of rivers, which has been successfully carried out by the Waipapa Company on an ocean beach by a Welman centrifugal-pump dredger, about £300 worth of gold per week being saved from sand and gravel, yielding about 3 grains or sixpence in value per ton. This dredger is not suitable for lifting coarse material, and where the stuff contains stones above 3 inches across, the ordinary bucket and ladder system is found to be more advantageous. Among the reducing processes noticed, that of Messrs. Macarthur and Forest, for dissolving out gold and silver by a weak solution of an alkaline cyanide and precipitating by filtering the liquors through granulated zinc, is the greatest novelty. This is described in several places, both under its own name and as the Cassel process, as it has been taken up by the Cassel Company of Glasgow in place of the original, but defunct process of Cassel for chlorinating gold ores by the electrolysis of common salt.

Astronomical Lessons. By John Ellard Gore. (London: Sutton, Drowley, and Co., 1890.)

We greet with pleasure all works that have for their object the exposition of the principles and facts of astronomy, for this is the science which, perhaps above all others, is pursued for its own sake, and the end of the study of which is knowledge, pure and simple. It is especially satisfactory to meet with works of this character when written by practical men, hence we view with gratification the little book before us. All astronomers are acquainted with Mr. Gore's astronomical labours, and to them the productions of his pen need no recommendation. As might be supposed, the best chapters are on "Double and Binary Stars" and "Variable Stars." Other chapters deal with the figure and motions of the earth, the sun, and planets, and the measurement of time. We note that Mr. Gore, while asserting that the nebulæ are probably masses of glowing gas, does not put forward the now exploded notion that nitrogen is one of the main constituents.

The book may well be said to be an easy introduction to larger and more advanced works on astronomy, and a useful guide to beginners in the study of this fascinating science.

Soap-Bubbles. By C. V. Boys, F.R.S. "Romance of Science Series." (London: Society for Promoting Christian Knowledge, 1890.)

Everyone who has attended lectures delivered by Mr. Boys must have been struck by his ingenuity and zeal in designing and performing experiments illustrative of the subject he has under consideration. The present little work consists of a course of three lectures he delivered to a juvenile audience at the London Institution, and the subject dealt with is one in connection with which a great number of experiments can be performed. The author's idea throughout has been, not to display a large number of hard experiments, but to perform, by means of the simplest apparatus (in many cases only a few pieces of glass, india-rubber tubing, and other simple things readily obtained), interesting and instructive experiments that may be easily repeated by young people with a little care and patience. In order to facilitate the repetition of most of them, he has added some practical hints at the end of the volume, by the careful perusal of which the reader will be fully rewarded. It is unnecessary to allude to the special points touched on in the course of these lectures: suffice it to say that the book is written in simple and clear language, and illustrated with a set of excellent woodcuts. We may note that the figure placed at the end can be easily converted into a thaumatrope for showing the formation and oscillations of drops. If the disk, made to rotate, be held up to a looking-glass, the drop will first appear to form; it then gradually increases in bulk, changing its form all the time; at a particular stage a waist is formed, which grows narrower and narrower until the drop falls. The trouble of mounting the illustration in the specified way will be amply repaid by the interesting phenomena mentioned above.

The Canary Islands. By John Whitford, F.R.G.S. (London: Edward Stanford, 1890.)

In this little book Mr. Whitford records the impressions produced upon him during a tour in the Canary Islands. He has chapters on Grand Canary, Tenerife, La Palma, Gomera, Hierro, Lanzarote, and Fuerteventura; and as he writes clearly, and displays a considerable power of observation, the volume should be of interest even to readers who do not themselves propose to undertake a like journey. In his travels the author always had his camera with him, and some of the results are seen in the pleasant woodcuts with which his descriptions are illustrated.

LETTERS TO THE EDITOR.

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A Remarkable Ice-Storm.

In March 1884 I wrote to you in regard to a heavy ice-storm which we had experienced on the 7th and 8th days of that month, giving some statistics as to the thickness of the ice deposits on trees and as to the weight which the extremities of branches were carrying. I can now report to you a more remarkable storm of the same kind, the effects of which still continue more than sixty hours after the storm has ceased; and there seems to be little hope that the morrow will give us an unclouded sun to loosen the casing under which the trees are labouring.

Before sunrise on the 17th instant, a light snow began, with the wind blowing gently from the north; the storm soon changed to a fine hail, which prevailed throughout the day, and by sunset had covered the ground to the depth of some two inches; then followed a rather heavy rain, the thermometer standing not far from the freezing-point. The rain ceased for a while about eight o'clock, and I found that the amount of precipitation reduced to water was 1·25 inches. Before midnight the rain began to fall again, and the ice formed rapidly on trees, fences, wires, and everything that could hold a drop of water for an instant. The amount of rain in the night, augmented by a little drizzle and a light snow on the following day, was 0·67 inch, making the total precipitation during the entire storm 1·92 inches. In the morning the appearance of everything out of doors needed but bright sunlight to make it beautiful in the extreme, except for the feeling that many trees were maimed or ruined, and that the wires on which the community depends for light and for telegraphic and telephonic communication were in a state of dire confusion. But I can best convey an idea of the effects of the storm by giving the results of some measurements which I made on our College campus.

The fence at the north side of the campus was decorated with icicles about eight inches long; the trees were covered with ice, coating every twig and hanging in icicles, which were formed of course nearly vertically, but which, as the trees bent under the increasing weight of the ice, stood out like fringes in every direction. One English elm, fifteen feet high, touched the ground with its topmost branches; its stem, 1·6 inches in diameter, carried 0·65 of an inch of ice on its most exposed

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